# MAD-1
# MADI Monitor

# Engineering Specification
# Revision 2
# Preliminary
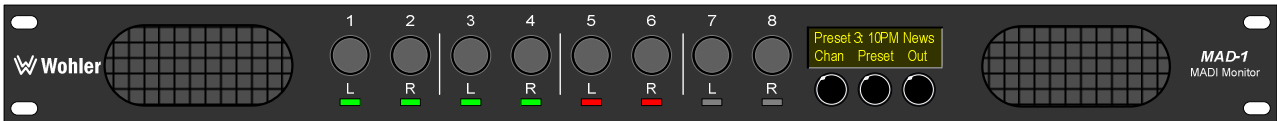
## *Introduction*

The MAD-1 MADI Monitor can be connected in series in a 64-channel MADI stream to audibly monitor up to 8 channels.   Operation is simple and intuitive.

## I. Features

       a. Coax MADI Input.

       b. Reclocked MADI Output.

       c. Balanced adjustable or fixed analog outputs.

       d. Speaker mute for output mix only.

       e. Channel presence indicators.

       f. 8 presets (channel names will be shared among all presets.

       g. 122 x 32 pixel yellow monochrome OLED display.

       h. 1RU shallow depth chassis fits anywhere, even in crowded production trucks.

       i. Internal power supply with IEC connector.

## II. Controls and Indicators

The front panel controls and indicators are described by the following table:

| LED / Button | Function | Active Color | Inactive Color | Other |
|---|---|---|---|---|
| 8 Rotary Encoders | Per channel level adjust / mute / change preset / setup | | | |
| 8 LEDs | Channel status indicator | | Off | No audio on MADI channel |
| | | Green | | Audio present on MADI channel |
| | | Red | | Audio muted |
| | Setup | Yellow | | Flashing when the associated encoder is to be used in conjunction with the display for setup in a menu |

| Button 1 - 3 | Function select / setup | | | These are soft keys whose function is defined by the display above them |
|---|---|---|---|---|
| Character Display | Status / setup | Yellow | | Lit in all modes when power is on |

The back panel…

# III. Enclosure

The product will be housed in a 1RU steel shallow rack chassis consisting of 3 pieces: bottom-sides-back, front panel, top cover.  The dimensions will be 1.75 x 19 x 4.75 (HxWxD inches) (depth measured from rack mounting to BNC connector protrusion at rear).  Side vents may be provided for cooling.  The front panel will appear as follows:
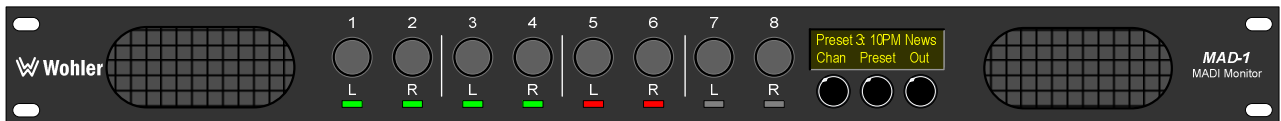


The back panel will appear as follows:

An external power supply brick will be provided, which will connect to the locking power connector on the back panel.  The brick will contain an IEC power cord connector for use with 100 to 240 VAC +/-10% 50/60 Hz power with country-specific power cords.  Only a North American power cord will be supplied with the product, although any IEC cord may be substituted in the field.

The chassis will be painted black, masked to allow the chassis to form a Faraday box.  Internal overspray is acceptable, except for the masked areas.  Silkscreening of front and back panel legends will be with white paint.

# IV. Operation and Setup

Operation and setup of the MAD-1 is performed as follows:

**Level Adjust:**  Rotary encoders 1 – 8 are used to adjust the speaker volume of each of the 8 selected channels, respectively.  As each encoder is rotated,

the display shows the channel number and name as well as the overall level in a bar graph for at least 3 seconds:
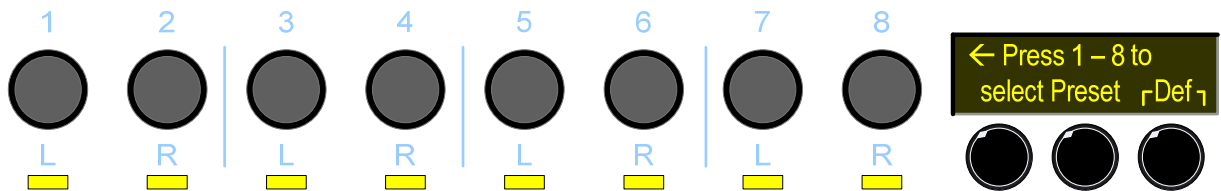
> **Ch 1: Mic 7 Feed**
> IIIIIIIIIIIIIIIIIIIIII
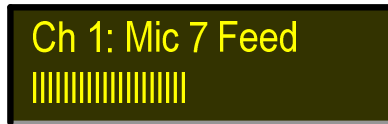
**Channel Mute:**  Pressing rotary encoders 1 – 8 will mute each of the 8 selected channels, respectively.  When muted, the LED beneath each rotary encoder will light red.  This is an alternate action control, so when pressed a second time, the channel returns to the volume setting it had when it was first muted.  When each encoder is pressed, the display shows the channel number and name and indicates the channel is muted:

> **Ch 1: Mic 7 Feed**
> (Muted)
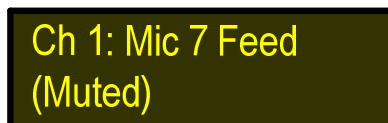
**Save, Name, or Recall a Preset:**  Normally the display will indicate the current preset and label the soft keys beneath it:

> **Preset 3: 10PM News**
> Chan    Preset    Out

To make changes to the preset, press the **Preset** soft key.  The LED beneath each rotary encoder will blink yellow to indicate that they are now to be used in conjunction with the display menu and the display will indicate that one of the rotary encoders must be pressed.  Alternatively the **Def**ault soft key may be pressed to reset all presets to the factory default:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|

> ← Press 1 – 8 to
> select Preset  ⌐Def⌐

| L | R | L | R | L | R | L | R |
|---|---|---|---|---|---|---|---|

After the encoder corresponding to the selected preset is pressed, the LED for the selected preset will light steady yellow and the other LEDs will turn off. The display menu will ask for the desired action, **Save**, **Name**, or **Recall**:

```
Preset 3: 10PM News
Save   Name   Recall
```
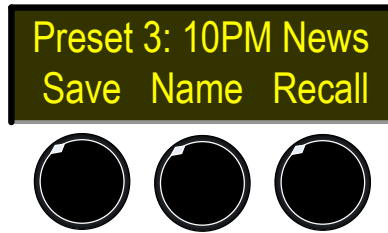
**To recall the selected preset**, press the **Recall** soft key.  The preset is recalled and the display returns to normal, showing the number and name of the recalled preset.  The 8 LEDs return to their normal function of displaying audio presence.

**To save the current channel configuration**, into the selected preset, press the **Save** soft key. The preset is saved and the display returns to normal, showing the number and name of the current preset.  The 8 LEDs return to their normal function of displaying audio presence.

**To name the selected preset**, press the **Name** soft key.  The text entry menu appears, indicating that the 8th rotary encoder has been temporarily repurposed to select text.  The LED beneath the 8th encoder will blink yellow at the same rate as the blinking text position cursor on the display.  This is intended to indicate that it is now to be used in conjunction with the display menu:

```
8

      Preset 3: 10PM N_
R     ←Pick   Done   Back
```

Turn the encoder to select the character indicated by the cursor.  Press the encoder to select the character and move the cursor to the next position.  Use the **Back**space soft key to correct any errors.  Up to 10 characters may be entered.  When finished, press the **Done** soft key. The front panel display will return to normal.

If the **Def**ault soft key is pressed, the following menu appears to verify that the requested action.  This is done to prevent accidental erasure of all of the presets.

Set Preset Default?
No      ⌐Yes⌐
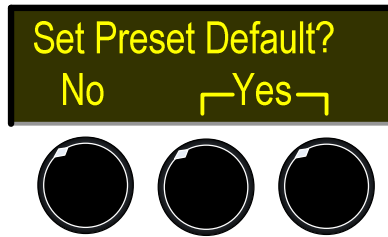
**To set all of the presets back to their factory default,** press both of the
**Yes** soft keys simultaneously.  To keep the existing preset settings, press the
**No** soft key.

If the Yes soft keys are pressed, the screen verifies that the presets are set to
their default and also displays the system software version. After 5 seconds,
the front panel display will return to normal.

Presets set to Default
S/W Version:  1.00
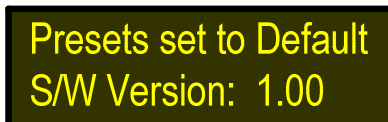
If the No soft key is pressed, the screen verifies that the presets were not
changed and also displays the system software version.  After 5 seconds, the
front panel display will return to normal.

Presets Not Changed
S/W Version:  1.00
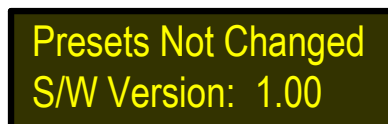
**Mic, Name, or Select a Channel:**  Normally the display will indicate the
current preset and label the soft keys beneath it:

Preset 3: 10PM News
Chan    Preset    Out

To make changes to a channel, press the **Chan**nel soft key.  The LED beneath
each rotary encoder will blink yellow to indicate that they are now to be used
in conjunction with the display menu and the display will indicate that one of
the rotary encoders must be turned:

1   2   3   4   5   6   7   8

L   R   L   R   L   R   L   R

← Turn 1 – 8 to select Channel
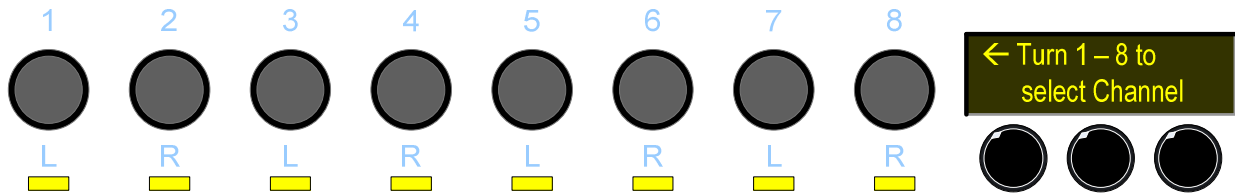
As soon as an encoder is turned or pressed, its LED will light steady yellow to indicate that it alone is now to be used in conjunction with the display menu and the other LEDs will turn red. Audio from the other channels will be temporarily muted and only the audio from the indicated channel will be heard in both speakers as the encoder is rotated. If it is necessary to adjust the volume of the channel at this time, hold the yellow-indicated encoder in and turn to adjust the volume. The display menu will now indicate which channel is being selected as the encoder is turned. It will also ask for the desired action, **Mix**, **Name**, or **Select**:

Ch 1: Mic 7 Feed
Mix     Name  Select

**To mix the selected channel position**, press the **Mix** soft key. The mix menu appears with the current selection underlined:

Ch 1: Mic 7 Feed
<u>Left</u>     Both    Right
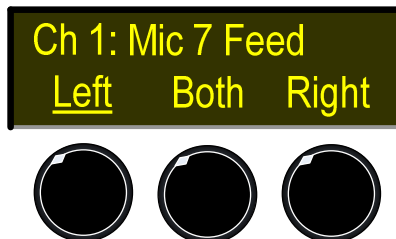
Press the **Left** soft key to hear this channel position on the left speaker. Press **Both** to hear this channel position on both speakers. Press the **Right** soft key to hear this channel position on the right speaker. The front panel display will return to normal.

**To select the current channel**, into the channel position, press the **Select** soft key. The preset is saved and the display and audio monitoring returns to normal, showing the number and name of the current preset. If the selected MADI channel was an odd numbered channel, it will be heard on the left speaker channel. If it was an even numbered channel, it will be heard on the right channel. The 8 LEDs return to their normal function of displaying audio presence.

**To name the selected channel**, press the **Name** soft key. The text entry menu appears, indicating that the $8^{th}$ rotary encoder has been temporarily repurposed to select text. The LED beneath the $8^{th}$ encoder will blink yellow at the same rate as the blinking text position cursor on the display. This is intended to indicate that it is now to be used in conjunction with the display menu:

8

Ch 1: Mic 7 F_
←Pick   Done    Back

R

Turn the encoder to select the character indicated by the cursor. Press the encoder to select the character and move the cursor to the next position. Use the **Back**space soft key to correct any errors. Up to 10 characters may be entered. When finished, press the **Done** soft key. The front panel display will return to normal.

**XLR Output Mode:** Normally the display will indicate the current preset and label the soft keys beneath it:

Preset 3: 10PM News
Chan    Preset    Out
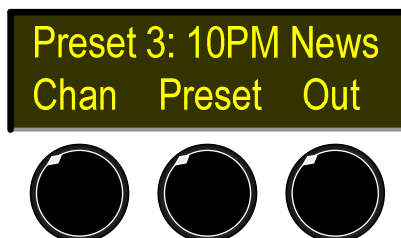
To change the XLR Output Mode, press the **Out** soft key. The following menu will appear with the current XLR Output Mode underlined:

XLR Output Mode
Fixed     Var     Mute
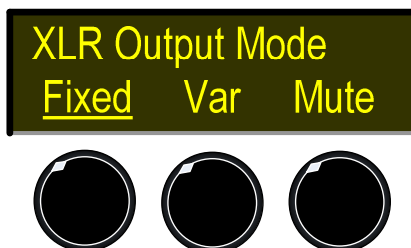
Press **Fixed** for a fixed level, full output stereo mix of any channels currently heard in the speakers. Press **Var**iable for a stereo output mix of any channels currently heard in the speakers, but adjusted by the 8 level controls. Press **Mute** for the same mix as the **Var**iable selection, but with the speakers muted.

# V. Specifications

- o Input: MADI BNC connector
  - o Sample Rate:  48 kHz, 64 channels
  - o Channel Doubling:  No
  - o Varispeed:  No
  - o Demultiplexing:  8 individual channels
- o Output:  Reclocked MADI BNC connector
- o Output:  Balanced XLR for left channel
  - o Same as mix for left speaker
  - o Level:  +4 dBu, either affected by volume controls or not depending upon programmable setup
- o Output:  Balanced XLR for right channel
  - o Same as mix for right speaker
  - o Level:  +4 dBu, either affected by volume controls or not depending upon programmable setup
- o Output:  Balanced XLR for mono mix
  - o Same as mix for left and right speakers
  - o Level:  +4 dBu, either affected by volume controls or not depending upon programmable setup
- o Acoustic Frequency Response:  300 kX to 10 kHz (+/- 6 dB)
- o Acoustic Distortion:  < 2% 300 Hz to 10 kHz
- o Acoustic Output:  90 dB SPL @ 2 feet
- o Power:  IEC connector, 100 – 240 VAC +/- 10%, 50/60 Hz

# VI. Hardware Design

The hardware will be implemented on two circuit boards. The main circuit board contains all of the MADI and audio circuitry.

The main board will interface to the front panel board with a right angled PCB to PCB connector. The front panel board will contain the all of the front panel components.

The PIC microprocessor subsystem will reside on either PCB, to be determined according to space availability and connection efficiency. There will be no internal cables (unless there is no other option relative to the locking power input cable.

An internal 2" X 4" 12 VDC power supply module will provide power to the internal circuitry. This supply will operate over the range of 100 – 240 VAC +/- 10%, 50 or 60 Hz.

It remains to be decided whether a off-the-shelf MADI module will be used for the MADI interface or whether we will design this internally.

Possible optical interface option.